

recognized with increasing frequency in children following repair of esophageal atresia. Nocturnal reflux is particularly insidious and may precipitate an acute coughing episode in a sleeping child. Recent application of more precise diagnostic studies to the evaluation of reflux has made it possible to identify symptomatic children more easily. Whereas the findings on cine-esophagrams may not always correlate with the clinically symptomatic child, measurement of esophageal pH after abdominal compression (Tuttle test), measurement of lower esophageal sphincter pressure and esophagoscopy with biopsy, provide a more complete physiologic evaluation of gastroesophageal reflux. The inability to do many of these studies in young children without heavy sedation or general anesthesia and the lack of studies which indicate normal values has made the interpretation of specific values difficult; however, comparison with data obtained from other patients in the same laboratory and studies from patients who have undergone surgical repair of reflux have provided guidelines.

Gastroesophageal fundoplication has been used effectively to prevent further reflux in a large number of symptomatic children with low morbidity and less than 1 percent mortality. Concomitant temporary gastrostomy prevents the gas bloat syndrome, assists in postoperative feeding and serves as a partial gastropexy. Further application of fundoplication for the management of symptomatic infants and young children with gastroesophageal reflux appears justified.

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Shock: Rapid Transfusion, Calcium Levels, pH and Body Temperature

THERE ARE MANY circumstances today in which rapid transfusion of blood is critical in resuscitation, and yet all surgeons are familiar with patients who have just received a large amount of blood and, in spite of this, suffer acute myocardial depression and death by way of the mechanism of anoxia and arrest.

It has been shown both experimentally and clinically that rapid transfusion (that is, at a rate exceeding 1 ml of blood per kg of body weight per minute) of citrate-phosphate-dextrose (CPD) blood reduces ionized calcium in the arterial blood immediately following the infusion, which in turn causes decreased myocardial function, as documented by Starling function curves (stroke work versus filling pressure). This dangerous myocardial depression can be prevented by the simultaneous administration through a separate central venous line of calcium chloride at the rate of 1 mg per ml of CPD blood administered.

This same phenomenon of myocardial depression may occur if a patient receiving hemodialysis is suddenly subjected to a large load of dialysate low in ionized calcium.

In many of the situations in which this myocardial depression occurs, the patient in need of the transfusion is apt to be hypothermic, as well as acidotic, and if the blood which is administered is itself acidotic and cold, the transfusion may aggravate these conditions.

What is the correct serum pH for optimal myocardial function during hypothermia? The answer to this question is derived from observations by comparative physiologists. Cold-blooded animals maintain normal myocardial function during hypothermia in contrast to man. The cold blooded animals hyperventilate and become alkalotic at low body temperatures, developing, for instance a pH of 7.70 at 28°C. In experimental animals, myocardial function was measured at a body temperature of 28°C and at a pH of 7.40. A significant depression was observed which was largely relieved by rendering the animals alkalotic.

These observations only confirm the importance of making the hypothermic patient in shock normothermic, treating acidosis vigorously while the patient is hypothermic, and further reducing the risk of additional myocardial depression by the simultaneous administration of ionized calcium when large amounts of CPD blood are administered rapidly. These precautions may avoid the sudden collapse of the patient who otherwise seems to have been properly treated.

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